

TRUCK SPECIFICATIONS:

Sprayer that shall be mounted on a TDOT supplied **2021 Kenworth model T-370**.

MODEL: 2021 T-370 CONVENTIONAL

CHASIS:

Wheelbase (in):	194
Overhang (in):	71
Fr Axle to BOC (in):	68
Cab to Axle (in):	126
Cab to Eof (in):	197
Overall Comb. Length (in):	306

Note: All associated costs shall be at the expense of the successful bidder if any frame mounted attachments such as air dryers, batteries, fuel tanks, etc. require relocation. When relocation of frame mounted attachments are required, no splicing of electrical cables or air lines is acceptable.

SPECIFICATIONS

CHASIS MOUNTED ROADSIDE SPRAYER

REV. 9-19

It is the intent of these specifications to describe a complete and operable roadside spraying system for the controlled application of herbicides. The sprayer manufacturer or their local franchised dealer will install the system on a suitable chassis provided by the Tennessee Department of Transportation.

Only new (unused) current standard production models built for the U.S. market will be considered acceptable. Printed literature and specifications describing equipment as offered must be included with proposal. Any recent changes and or features offered as standard or required for the intended use of the specified equipment will be supplied. All accessories required by these specifications shall be identical in quality and design to those normally supplied and installed for sale through regular commercial channels.

NOTE: Upon receipt of an order the vendor will provide a detail drawing of the custom flatbed with components as specified. The drawing must show the precise size and mounting location of all specified components as dictated by chassis GVW, bed dimensions and convenience of operation.

Two TDOT Approved Brand names are Norstar or Roadside Inc. All bids must meet or exceed specifications. Failure to comply with specifications will not be considered.

SPECIFICATION COMPLIANCE: Requires a manufacture (vendor) offering their standard production model to provide a list with a minimum of three customers currently using equipment as described in these specifications.

GENERAL DESCRIPTION: The basic spray system shall include a water tank, centrifugal spray pump, chemical tank(s), two (2) boomless spray head(s), and a computerized chemical injection control and pumping system. All components in the water and chemical systems must be non-corrosive type, compatible with chemicals currently used by the purchaser.

1a. Water Tank: Shall be a 1635-gallon minimum **black** elliptical tank capacity (no exceptions). The tank shall have a removable, anti-surge, “Butterfly Baffle” system that reduces tank volume by no more than 1.5%. Bolt-in baffles or tank indentations will not be acceptable. The tank and baffle material must be UV stabilized polyethylene. The tank will be secured to a chassis mounted flatbed with 4 heavy duty, galvanized, tubular steel bands. The bolts securing the bands to the flatbed must pass through the flatbed deck and bed cross-members. The bands must provide adequate support for continuous off-road operation. The tank lid must be 16-in. diameter minimum, positive locking type with an air vent to prevent damage from excessive pressure or vacuum. There shall be two (2) 1 1/4” brass ball valves installed as close to the bottom of the tank as possible. The valves shall be mounted directly to the tank with bulkhead fittings and it shall be possible to open and close the tank valves from the right side (curb) of the truck while standing on the ground. Both tank valves will be plumbed to a “Tee” fitting mounted below the bottom center of the tank. The “Tee” outlet will be plumbed to the spray pump inlet. The hose between the tank and water pump 1 1/4” non-collapsible suction type. The water tank drain shall be at the lowest point in the suction line. The tank shall have a ladder mounted at the main tank for ease of filling or adding drift control.

1b. Water Tank Fill: The spray unit will be equipped with a 2” minimum line installed to fill through the tank lid with a 4” anti-siphon air gap. The fill line must run through and under the flatbed deck to a convenient location. A 2” Y-strainer shall be installed in line at a location that allows easy access. The fill hose connection will be a 2” male cam lock fitting with a dust cap and retaining chain.

1c. Loading Hose: To be twenty-five (25) ft. long by 2-in. mill hose and NSH fire hydrant female on the other.

2a. Sprayer Water Pump: Shall be Hypro model 9303C-HM4C or Ace model FMC-150-hyd-206 with a 1 1/2-in inlet and direct-mount hydraulic motor. The sprayer pump must be capable of producing 90 PSI and 60 GPM. The pumping system shall maintain water pressure at a constant level as required for the intended use. The fittings at the pump inlet, outlet and chemical injection points must be brass or stainless steel (no exceptions). A strainer with a replaceable 30-mesh stainless steel screen will be installed on the suction side of the water pump. A high-pressure filter, with replaceable 50-mesh screen will be installed in the pump discharge line as close to the pump as practical (prior to the pressure reducing valves). Mounting location for the water pump and related components must not limit access for routine maintenance. In addition, a water transfer valve will be plumbed inline on the discharge side of water pump for the transfer of

water. A 2 in. female cam and groove fitting mounted to the valve will be required for transfer of water.

2b. Sprayer Water Pump Drive: Must be a load-sensing hydraulic system sized to power the sprayer pump at required flows and pressures when the chassis engine is operating at 1000 RPM. The hydraulic oil reservoir will have a minimum capacity of 20 gallons and include a suction strainer, return filter, sight and temperature gauge, filter breather, and full-open ball valves for return and suction lines. Both ball valves must be locked open with plastic tie wraps. Mounting location for the reservoir will be between the chassis cab and cab shield or on or below the flatbed deck. The hydraulic system must utilize a variable displacement, piston pump (4.3 cubic inch pump minimum), and driven "live" from the chassis **ALLISON RDS 3500**

TRANSMISSION PTO. The on-off switch for the sprayer pump will be in the cab control center. The sprayer pump speed control will be a manually adjustable hydraulic flow control valve. The water pressure plumbing from the sprayer pump must include a 2 ½" liquid filled pressure gauge installed for easy viewing when adjusting the water pump speed control.

2c. Boom Hydraulic System: Shall be powered via the hydraulic PTO pump. The operating valves for the spray boom will be electro-hydraulic cartridge style in a single manifold. The manifold must include counter balance valves for boom and stick lift cylinders, an adjustable main relief valve, and adjustable high/low speed (flow) control. The valves will be remotely operated with a single cab control lever (no exception). The functions of the control will include power on/off with indicator light, hydraulic two-speed, (enables an operator to increase the speed of all hydraulic functions for stowing spray boom, and maneuvering around roadside obstructions), main- boom swing, main-boom raise and lower, stick-boom rotation and outside spray head tilt.

3a. "Boomless" Nutating Spray Head(s): Shall be Norstar Model NSC-20108 with remote controlled swing (in out) and 30-degree tilt (up down). The spray head(s) will be attached to a 2 1/2-in., schedule-40 steel pipe swing post that mount in a heavy-duty greaseable socket installed securely in the front right and left corner(s) of the flatbed deck. The socket(s) will include a breakaway feature with manual brake adjustment. The spray head must produce a 28-ft. wide minimum (horizontal plane), no-streak spray pattern, using all brass or stainless steel, solid stream nozzles (plastic nozzles are not acceptable). The spray head must have seven (7) adjustable nozzle assemblies that produce individual spray swaths with widths of 2-ft., 2-ft., 4-ft., 4-ft., 4-ft., 6-ft., 6-ft. The first four- (4) nozzle assemblies must nutate at 45 Hz to produce uniform (no streak) spray patterns for a combined coverage of 12-feet. The nozzles must be sized for a total application rate of 25 gallons per acre at 13 MPH. The spray head assembly will include nine (9) Spraying Systems Model 144 direct acting solenoid valves, (diaphragm type solenoids are not acceptable), and nine (9) 1/2-in pressure regulators with 2 1/2-in. diameter liquid filled gauges. All spray head hose connections at the solenoid-regulator assembly must include 3/4-in. camlock quick disconnects. The solenoid-regulator assembly will be stacked vertically in a steel panel and securely attached to the flatbed deck and cab shield. The spray head will have large removable metal side panels to reduce wind shear and protect components from roadside obstructions.

OR:

Roadside Inc RSI-2870-V2 - Two 8 section boomless air induction spray heads. Spray head must consist of a combination of flat fan nozzles mounted onto a brass or stainless-steel air induction venturi and straight stream nozzles sections configured to cover a 30ft spray swath at 11 mph. The individual boom sections spray swaths will consist of the following widths: 6ft, 6ft, 6ft, 6ft, 6ft. Three of the 8 boom sections will be configured to spray a vertical swath width for chemical side trimming, covering 6ft, 6ft, & 6ft respectively. Nozzles must be mounted in a fixed position located on a radial arc to ensure proper coverage and to ensure that the nozzles shall never move from a fixed position. The head must be tiltable up/down (from the cab). The spray system manifold shall consist of 2- 6 section valve manifold systems to control flow to each boom section.

3b. Articulated Spray Boom Assembly: Shall be a RSI-20520 or a NSC- 20520-LS, designed and constructed specifically for the intended use. The spray boom shall be capable of producing a 50-ft. minimum spray width using two boomless spray heads, or two spray heads and a two-section boom assembly. The spray boom must be 19-ft. long minimum with the boom assembly fully extended. The pivot points and associated linkage on the boom sections must have rotary pins and bronze bushings. The main boom will be 4-in. minimum, square steel tubing attached to a heavy duty, freestanding, turret and pedestal. The pedestal must be bolted to the flatbed deck with the ability to place on the right or left side, directly behind the cab shield (no exception). The boom must be transferable to the left side of the truck for driver side spraying. There shall be sufficient structural support on both sides of the truck to support boom operation at full extension. All hydraulic manifolds and hoses shall be mounted and plumbed in such a way that does not require disconnections to transfer the boom from right to left. Upon delivery the boom must be placed on the right side. The boom turret will rotate in two (2) sealed, heavy duty, tapered, roller bearings and include an integral friction clutch type breakaway. The override resistance for the clutch must be adjustable and all components easily replaceable. The transport position for the boom must be below the top of the water tank, parallel with the side of the flatbed, and inside the width of the bed. A deck-mounted stanchion with padded cradle will be provided to carry the boom for transport and when spraying with inside spray head only. The horizontal swing for the main boom must be a minimum of 100 degrees from storage position to operate position and 75 degrees down from the fully raised position. The stick boom section (outside boom) must be constructed from 3-in. square steel tubing. Lifting, lowering or rotating either boom section must be accomplished with direct-mount, double acting, hydraulic cylinders. The stick boom will rotate hydraulically a minimum of 180 degrees from the stowage position (parallel to the underside of the main boom) to full extension. The main control system shall have a “**Remote System**” for boom operation while outside the truck. The remote will have the following functions: Power on/off, Water on/off, Rotate In/Out, Boom Up/Down, Boom Stick In/Out, Nozzle Up/Down, and status indicator. A boom less spray head will be securely attached to the outside end of the stick boom. The spray head will have three (3) individual, solid stream nozzle assemblies that produce a 30-ft. wide spray pattern. The spray head must have an electric actuator that provides a minimum of 25-degrees of up/down tilt. Heavy-duty side panels will protect spray head components from contact with right-away obstructions.

Note: Articulated spray booms utilizing sprockets, chain, cable, sheaves or gears will not be acceptable.

4a. Cab Control Center: Must have a computer console and separate electro-mechanical console (no exceptions). Both consoles will be installed inside a steel framework attaches to a double articulating arm that allows either the driver or passenger to operate controls conveniently. The arm shall securely attach to a floor mounted square steel pedestal. The pedestal shall include necessary bracing and a heavy-duty steel base plate to minimize vibration. All control cables connecting the control center to sprayer components will be run through the pedestal. All control cables connecting the control center to sprayer components will not require any additional power source or storage capacity other than that which is normally supplied as heavy duty by chassis manufactures. It will be possible to easily serviced or replace the mechanical console without opening, removing, or disturbing the computer console. All spray system controls must be in either the mechanical or computer console (no exception).

4b. Mechanical Control Console: To be a control console with switches for dual spray head tilt and fold, beacon light, water pump on/off, nine (9) boom valve switches, three (3) chemical tank level indicators and three (3) chemical tank agitators. All switches will be labeled for function, action, and indicator lights.

5a. Computer Console: Will be a Norstar or TASC Model 6300. The console must operate a minimum of 3 chemical injection pumps and automatically maintain operator programmed output rates at plus or minus 2% for each pump. When spray width or vehicle speeds change the computer will adjust the speed (output) of the injection pump(s) within 5 tenths of a second. A GPS antenna will be mounted above the game to provide ground speed and distance to the computer. The computer shall be maintain primary and secondary application rates for each chemical injection pump and allow preprogrammed application rates and spray widths to be changed on the go. Included in the console shall be nine (9) spray head solenoid indicator lights that operate in conjunction with solenoid switches in the mechanical console. Each of the nine spray head/boom sections must be programmable in 1-inch increments from 0 to 99 feet.

1. During normal operation the computer will display the following:

- Actual and simulated test speed of vehicle.
- Total area sprayed in acres.
- Total chemical dispensed by each injection pump.
- Primary and alternate application rates for each chemical injection pump in ounces per acre.
- Total volume of carrier and chemical dispensed.
- Width of individual spray head/boom sections.
- Distance traveled in feet-miles.
- Automatically scan information available on LCD screen.

2. The computer will display the following fault diagnostic information:

- Malfunctioning chemical pump.
- Chemical pumps shutdown.
- Chemical pumps operating too slow or too fast.
- Low voltage.

5b. Chemical Injection: Will be achieved with computer controlled, DC powered, peristaltic pumps (no exception). The pump drive motors and controllers will be protected with rugged weather tight enclosures. The pumps will inject chemicals directly into the carrier at the inlet of

the water pump. The pumps shall be the LEGACY (Mid-Tech) design with the capability of 0.5-350 oz. per minute. Three (3) pumps will be required. A 3-way ball valve will be installed in each chemical pump pressure line to direct flow to the injection point or calibration port. Each pump will include one each 3/16, 1/4, 3/8 and 1/2 inch color coded hoses.

5c. Field Maintenance and Calibration Kit: Shall include one (1) set chemical pump tubes per pump, one (1) pt. tube lube, nozzle pressure test kit, assorted hose clamps, two (2) solenoid valve repair kits, calibration container, water tank bag filter, sprayer pump filter screens, miscellaneous gaskets and electrical fuses, four (4) nylon spray head nozzle elbows and a clear vinyl calibration hose. All items will be contained in a heavy-duty, corrosive resistant plastic toolbox.

6a. Chemical Tanks: The tanks must be ultra-violet stabilized and have 10-in. diameter positive locking lids. Molded gallonage markers shall be easily visible on the tanks. Three (3) 3/4-in. brass ball valves (full open) shall be installed at the bottom of each tank. The shut-off valve for the tanks will be hard plumbed directly to the tank bottom (no exception). The second valve will be installed as a shut off to the chemical pump. The third valve will be installed as a tank drain. Each tank will be mounted in a painted stand on a heavy duty painted base plate and secured with a 1/8-in. by 4-in. adjustable steel band around the top, vertical portion of the tank. All tanks shall have low level sensors with an audible alarm and indicator lights in the cab control center. The tanks required are 30 gallon.

6b. Chemical Tank Agitators: The tank agitators shall be 12-volt drive motors, mounted outside the tank for ease of maintenance. The motor shall have a Viton lip seal for corrosion protection. The speed of the motors will be determined by an on/off, hi/low speed switch mounted in the mechanical control console. All cone bottom tanks shall require agitation.

7. Plumbing: All hose and fittings will be rated to exceed by 50 percent any maximum operating pressures possible in their respective systems. Any hoses installed in locations where chaffing or other damage might occur must have protective coverings. All hose and fittings will be adequately supported and secured throughout the system. All fittings and clamps shall be stainless steel or brass.

8a. LCG Flatbed: Will be designed and constructed for continuous off-road operation, low mount design 16 ft. long and not to exceed 102-in. wide. The platform shall be constructed to support a full 1635 gallon water tank and all component parts. The bed height will be 8-in. maximum above the top of the truck frame rails. The bed deck will be 3/16-in. steel diamond plate with spray coated anti-skid material. The outside bed rail shall be 3-in by 1 in. tubular steel with drain holes or 3/16 inch flat steel. Cross members under the deck shall be 3-in. by 1.41 lbs. channel with the web installed vertically. Modification, cutting or welding to the frame flanges or rails is unacceptable. The cross members will be spaced to provide the support necessary for all bed mounted components. The bed will have a sprayer pump well in front of the rear wheels and (based on truck) behind the rear wheels for the chemical concentrate tanks. The wells will be a minimum of 20-in. deep (top to bottom) by 20-in. wide (inside to outside) with solid sides and back. A 78-in. wide full height cab shield (solid metal) will be installed at the front of the bed. The cab shield will have a 1½-in. minimum, square steel-tube frame. A 3/4-in. by 9F gauge expanded metal window will extend from the top of the cab shield to approximately 6-in. below the bottom of the rear window. The rear of the bed must include a full-width, Grip-Strut step with adequate structure support.

8b. Flatbed Paint: All areas to be prime painted and finished with three coats of black Polyurethane paint to include anti-skid application on top.

9. Hand Wash Tank: Shall be a 9-gallon minimum polyethylene tank, mounted on deck in a convenient location with an on/off valve, and shall be a **RAVEN # 26676 or APPROVED EQUAL** The tank shall provide a clean supply of water for washing hands, eyes, face, etc. in case of an emergency. A faucet located in the bottom of the tank shall be provided, located on the curb side of the truck.

10. Eye Wash: Shall be an enclosed and sealed self-contained type, with 16-gallon capacity. The eye wash unit and the installation shall be mechanical pump supported and in accordance with American National standards Institute (ANSI) Z358.1-10981 Section 5.

11. Lighting: Unit shall be equipped with color coded automotive style wiring harness enclosed in a flexible plastic conduit. The stop, tail, turn, marker lights and reflectors shall meet all FMVSS 108 requirements. The wiring harness shall be mounted to the platform with mechanical fasteners. All lights shall be LED type. All rear mounted break stop tail and turn lights shall be LED and all clearance lights shall be LED.

12. Closed Chemical Load System: A chemical load system made of a manifold of valves, back flow valves and a 12 volt 13 gpm twin diaphragm pump to allow the operator to load chemicals from jugs, bulk tanks, or premixed containers. This system shall incorporate a fresh water add to or flush system from main carrier tank to eliminate cross chemical contamination. The load system shall be plumbed into each chemical tank and there will be no need for the operator to pour chemical in chemical tanks or leave the ground.

13. Tool Box: The rig shall be equipped with a lockable, weatherproof toolbox for stowing the hand gun and tools. The tool box mounting location will be preapproved by TDOT and shall be 18" X 18" X 24" and the amount and placement of the tool box will be determined by available space on the spray unit.

14. Tools & Small Parts Kit: Any special tools required for the day to day operation and maintenance of the sprayer shall be included with the rig. A small parts kit shall include, one (1) set of extra injection hoses (3/16", 1/4", 3/8" 1/2"), tube lube, calibration jar, tip pressure setting tool, 20 mesh screens, 40 mesh screens, and filter o rings.

15. Training: The successful bidder shall furnish a factory trained technician to conduct a full day seven (7) hours of training on the unit for operation and maintenance of the spray rig. The vendor shall coordinate with TDOT on location, time and material. Vendor shall provide video training on all aspects including: Operation, Service, Calibration, Troubleshooting, and Winterization. There will be five CD's with an individual training course on each. Five (5) complete training copies will be furnished, one (1) to Headquarters, four (4) with Sprayer.

16. Manuals: Two (2) each (paper, CD, flash drive) formats of manuals of detailing parts to include manufacturer part numbers. Service and operators manuals will be delivered with the sprayer. A plumbing schematic detailing sprayer components and their location will be supplied

at the time of installation and training. Include function of the injection system, all components, and wiring diagram.

17. Warranty: The spray unit shall be fully warranted against defects in materials and workmanship for 12 months from in-service date. The computer console shall be fully warranted for 30 months from in-service date. All warranties shall be as stated as above or manufacturer standard, whichever is greater. The in-service date shall commence following the completion of the training course.

18. Slow Moving Placard: Shall be a 16 in. by 16 in. reflective orange triangle with a red border identifying the spray truck as a “Slow Moving Vehicle”. It shall be mounted so that the placard can be reversed when operating vehicle at normal highway speed.

OPTIONS:

1. Hose reel & Handgun: A Hanney manual hose reel shall be installed under the bed of the spray unit behind the right rear wheels and the rear bed drop down. The hose reel shall have 100 ft. of ½” x 600 PSI sprayer hose with a Turbo hand gun.